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B7H HC H711 H760

(56) Documents Cited

GB 2268456 A **WO 92/08638 A1** **US 5494126 A**
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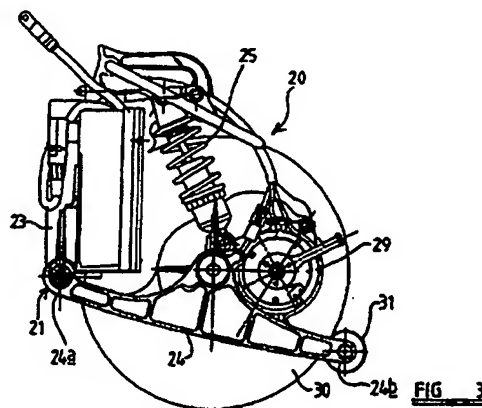
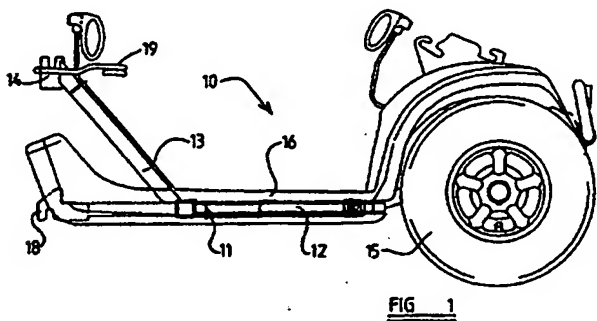
(58) Field of Search

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INT CL⁶ A61G 5/04
Online: WPI, EDOC, JAPIO

(54) Abstract Title

Personal mobility vehicle

(57) A personal mobility vehicle comprises separable and reconnectable front and rear parts, the front part 10 comprising a front frame portion 11, at least one front ground engaging wheel 15 rotatably mounted on the front frame portion, and front connection means, the rear part 20 comprising a rear frame portion 21, at least one rear ground engaging wheel 30 rotatably mounted on the rear frame portion, and rear connection means. The front and rear connection means being adapted to engage each other to connect the front and rear parts of the vehicle together for use. The front connection means comprises lower 18 and upper 14 elements, the rear connection means comprises lower 28 and upper 23 elements, and when separated one of the front and rear parts of the vehicle naturally assumes a position which permits access to the lower connection element thereon by the lower connection element on the other of the front and rear parts, and when the lower connection element on the other part is engaged with the lower connection element on the one part and the other part is released the front and rear upper connection elements are automatically brought together and engaged.



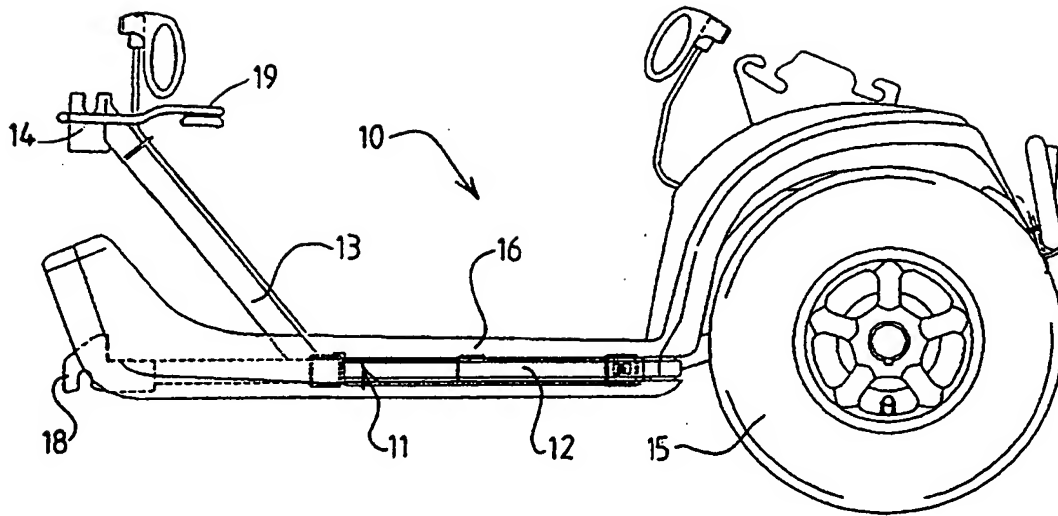


FIG 1

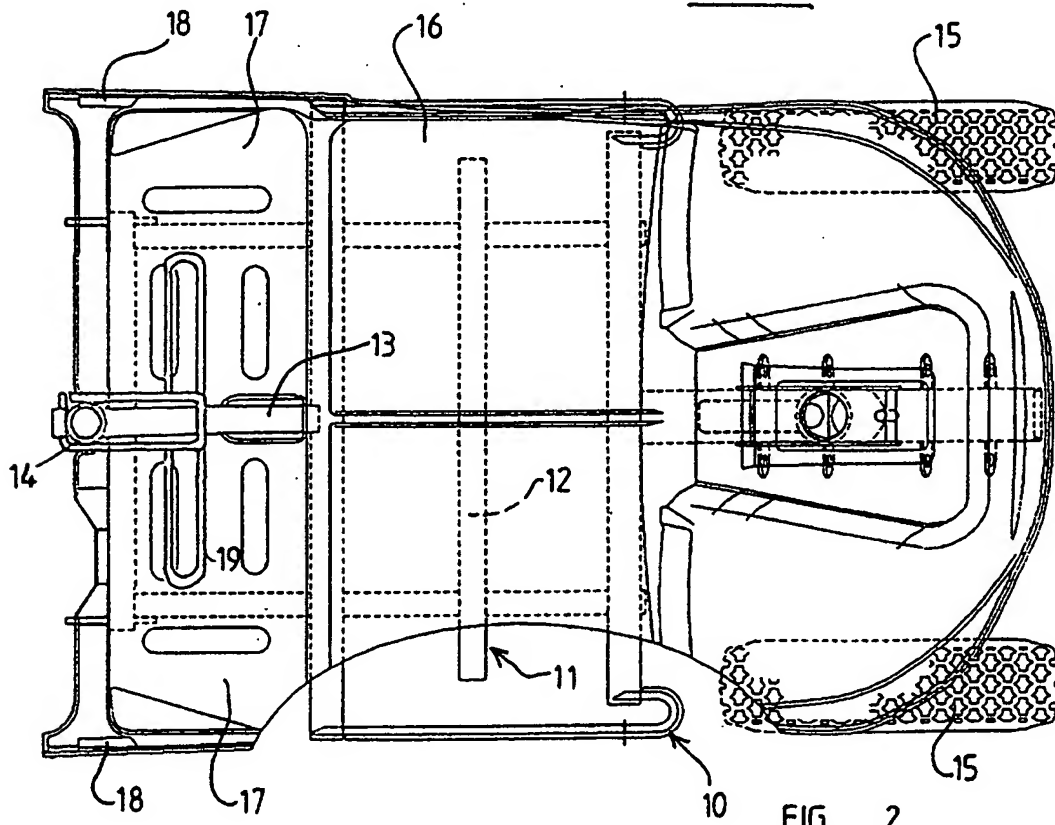


FIG 2

FIG 5

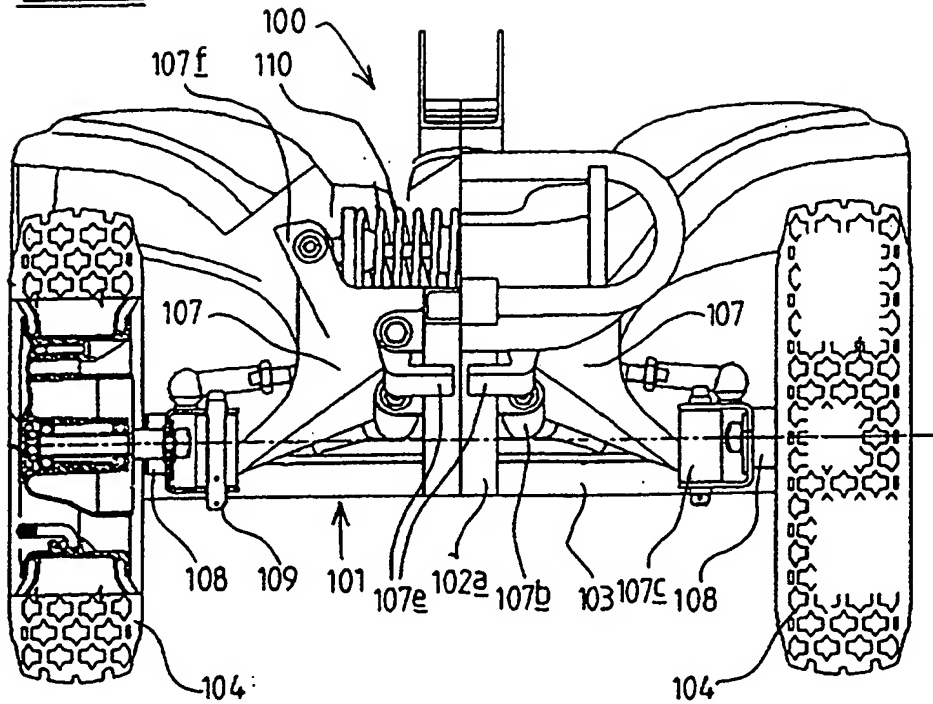
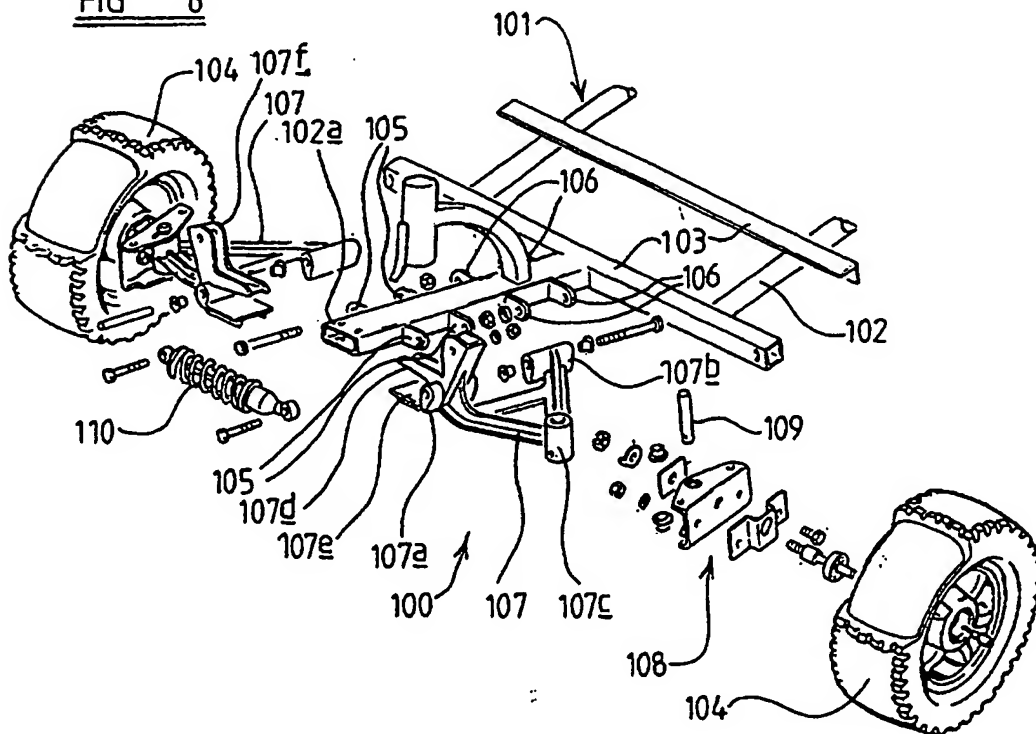


FIG 6



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PATENTS ACT 1977

DMW/A9169GB

Title: Personal Mobility Vehicle

Description of the Invention

The invention relates to a personal mobility vehicle of the kind generally known as a wheelchair or scooter, and in particular to such vehicles which are powered.

It is advantageous to be able to separate personal mobility vehicles of the kind mentioned above into front and rear parts in order to reduce their volume for storage and/or transport. It is known for such vehicles to be separable, but in general the task of reconnecting the front and rear parts for use requires a high degree of strength and/or more than one person. The parts themselves are often heavy, in particular as they must carry batteries to power the vehicle. Thus, if it is necessary to support the weight, of one or both parts, whilst carefully aligning the parts relative to each other this is undesirable.

Such personal mobility vehicles have generally been manufactured with little or no suspension. However, the lack of front suspension can prove dangerous if the vehicle is driven over rough ground, or indeed up high kerbs, as it can lead to wheels lifting off and the vehicle leaning over or even tipping over.

It is a first object of the invention to provide a personal mobility vehicle separable into front and rear parts which is simpler to reconnect for use than those of the prior art.

According to a first aspect of the invention there is provided a personal mobility vehicle comprising separable and reconnectable front and rear parts;

the front part comprising a front frame portion, at least one front ground engaging wheel rotatably mounted on the front frame portion, and front connection means;

the rear part comprising a rear frame portion, at least one rear ground engaging wheel rotatably mounted on the rear frame portion, and rear connection means;

the front and rear connection means being adapted to engage each other to connect the front and rear parts of the vehicle together for use;

wherein the front connection means comprises lower and upper elements, the rear connection means comprises lower and upper elements, and when separated one of the front and rear parts of the vehicle naturally assumes a position which permits access to the lower connection element thereon by the lower connection element on the other of the front and rear parts, and when said lower connection element on the other part is engaged with the lower connection element on the one part and the other part is released the front and rear upper connection elements are automatically brought together and engaged.

Preferably the vehicle further comprises securing means to secure the front and rear parts together when connected.

Preferably the rear part comprises two ground engaging wheels and a drive unit drivably connected thereto.

Preferably it is the rear part which naturally assumes the position which permits access to the rear lower connection element.

The front lower connection element may comprise downward facing hook formations on either side of the rear of the front frame portion, and the rear lower connection element may comprise recess formations on either side of the front of the rear frame portion.

The front upper connection element may comprise a tubular formation and the rear upper connection element may comprise a tubular seat support member.

The securing means may comprise an elongate member attached to a seat, which is inserted into the aligned tubular formation and tubular seat support member to secure the front and rear parts together. The securing means may further comprise one or more batteries provided to power the drive unit of the

vehicle when in place on the front part. The securing means may further comprises clip means adapted to clip into place over the one or more batteries to retain them in place on the front part.

It is a second object of the invention to provide a form of front suspension for a personal mobility vehicle.

According to a second aspect of the invention there is provided a personal mobility vehicle comprising a frame, two front ground engaging wheels rotatably and steerably mounted on the frame, wherein each wheel is mounted on the frame by an independent suspension member pivotally mounted on the frame with a suspension unit connected between the suspension members.

Preferably, the two independent suspension members are pivotable with respect to the frame about axes running longitudinally of the vehicle.

Preferably the suspension unit is provided above the pivotable connection of the suspension members to the frame.

Pairs of stops may be associated with each suspension member to limit their pivotal movement in upward or downward directions. The stops provided to limit downward pivoting of the suspension arms comprise resilient pads.

Examples of embodiments of the invention will now be described, by way of example only, with reference to accompanying drawings in which:

FIGURE 1 is side view of a front part of a personal mobility vehicle according to the first aspect of the invention, from which the steering tiller has been removed;

FIGURE 2 is a plan view of the front part of Figure 1;

FIGURE 3 is a side view of a rear part of a personal mobility vehicle according to the first aspect of the invention, from which the seat has been removed;

FIGURE 4 is a plan view of the rear part of Figure 3;

FIGURE 5 is a front view of the front of a personal mobility vehicle according to the second aspect of the invention; and

FIGURE 6 is a partially exploded perspective view of the front part of the vehicle of Figure 5, some parts having been omitted for clarity.

Referring to Figures 1 and 2, a front part 10 of a personal mobility vehicle is illustrated, with the steering tiller removed for simplicities sake. The front part 10 comprises a front frame portion 11, which comprises a chassis 12 and an upwardly and rearwardly inclined member 13 having a vertically oriented tubular portion 14 at its upper end. The chassis 12 bears at its rearward end two downwardly oriented hook formations 18. The front part 10 further comprises a pair of front ground engaging wheels 15, which are rotatably mounted on the chassis 12 by means of a spindle (not shown). The front part 10 also comprises a floor pan 16 which, in addition to supporting a users feet, provides recesses 17 adapted for receipt of two battery boxes (not shown), and a battery box retention clip 19 pivotably attached adjacent the tubular portion 14.

Referring now to Figures 3 and 4, a rear part 20 of a personal mobility vehicle is illustrated, from which the seat has been removed. The rear part 20 comprises a rear frame portion 21, which itself comprises a forward cross member 22, seat support 23, a trailing arm axle arrangement 24 and suspension unit 25. The trailing arm axle arrangement 24 is pivotally connected to the forward cross member 22 by means of a spindle 26 passing through bores provided through the cross member 22 and front portions of front arms 24a of the axle arrangement 24. The spindle 26 carries a disc member 27 on either end spaced from the front portions of front arms 24a, therefore defining recesses 28 therebetween.

The rear part 21 further comprises a drive unit 29 drivably connected to two rear ground engaging wheels 30, and two castors rotatably mounted on rear portions of rear arms 24b of the axle arrangement 24.

To reconnect the front and rear parts 10, 20 for use the following procedure is adopted. When separated the rear part 20 naturally tips backwards, due to its weight distribution, such that the castors 31 are on the ground in addition to the ground engaging wheels 30. In this position the recesses 28, which,

together with exposed portions of the spindle 26, form rear lower connection elements, are readily accessible.

The front part 10 is lifted, conveniently by means of the upwardly and rearwardly inclined member 13, such that the front ground engaging wheels remain on the ground but the hook formations 18 are no longer on the ground. The hook formations 18, which form front lower connection elements, are then engaged over the exposed portions of the spindle 26 with in the recesses 28. The front part 10 is then gently released and, due to its weight distribution, the front and rear parts 10, 20 pivot inwardly, the castors 31 coming off the ground, and the two parts 10, 20 reaching their connected positions.

This movement automatically brings the tubular member 14, which forms a front upper connection element, into place above and into alignment with the tubular seat support 23, which forms a rear upper connection element.

To secure the front and rear parts 10, 20 together for use a number of further steps are carried out. First, the battery boxes are put in place in the recesses 17, this step increases the weight of the front part 10, making it less likely that the two parts 10, 20 will separate by accident. Second, retention clip 19 is pivoted downwards into place over the battery boxes (to the position shown in Figures 1 and 2) to retain them in position. Third, the seat (not shown) is put in place, which is done by inserting an elongate member attached to the base of the seat into the seat support 23, first having passed through the tubular member 14. Thus, whilst the seat is in place the front and rear parts 10, 20 cannot be separated.

The connection arrangement described above provides the advantage that in order to effect connection of the front and rear parts 10, 20, it is only necessary to lift and handle the front part 10. Thus if required both hands can be used to lift the front part 10 into place. Furthermore, once the two parts have been engaged by means of their front and rear lower connection elements 18, 28, the connection is completed automatically due to the weight distribution of the respective parts, and not by further effort on the part of the user.

It should be noted that although the vehicle described above has a pair of front ground engaging wheels the invention is equally applicable to a vehicle having a single front ground engaging wheel. Other variations to the form of the vehicle may also be made without departing from the scope of the invention.

Referring now to Figures 5 and 6 a front suspension arrangement for a personal mobility vehicle will be described. Figure 5 illustrates part of a personal mobility vehicle 100 from the front, some parts not relevant to the invention having been omitted for the sake of clarity, and the left side of the figure (right hand side of the vehicle) being a cross section. Figure 6 illustrates the front part of the vehicle in partially exploded perspective view, again some parts having been omitted for clarity.

The vehicle 100 comprises a frame 101, having longitudinally and laterally extending members 102, 103. One of the laterally extending members 102_a extends forwardly and upwardly from the other portions of the frame 101.

The vehicle 100 further comprises two front ground engaging wheels 104 which are mounted on the member 102_a in such a manner as to be rotatable and steerable, as will now be described. On each side of the member 102_a two pairs of brackets 105, 106 are provided. Suspension arms 107, are of a generally triangular configuration, and comprising first and second frame attachment formations 107_a, 107_b, and a wheel attachment formation 107_c. Each suspension arm 107 is pivotally attached to the frame, formations 107_a and 107_b being attached to brackets 105 and 106 respectively, by means of appropriate fasteners. Each suspension arm 107 is also attached, via formation 107_c to a stub axle assembly 108, by means of a king pin 109, the stub axle assembly 108 in turn being connected to the respective wheel 104.

Thus the suspension arms 107 may pivot up and down with respect to the member 102_a, about axes running longitudinally of the vehicle 100. The wheels may pivot with respect to the king pins 109 to steer, that is about substantially vertical axes.

However, the suspension arms 107 further comprise upper and lower stops 107d and 107e respectively, which extend above and below the member 102a respectively to limit the degree of movement of the arms 107. Either of both of these stops 107d, 107e, may engage on a resilient pad, for example of rubber, to cushion the effect.

The suspension arms 107 further comprise upwardly extending brackets 107f. A suspension unit in the form of a spring/damper assembly 110 is pivotally connected at each end to a bracket 107f. The spring/damper assembly 110 further cushions the movement of the wheels up and down as they approach their limits of movement.

The suspension arrangement described provides the advantage that each of the front wheels can move upward or downward independently with respect to the frame to some extent. This in turn provides stability of traction and on cornering

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

CLAIMS

1. A personal mobility vehicle comprising separable and reconnectable front and rear parts;
 the front part comprising a front frame portion, at least one front ground engaging wheel rotatably mounted on the front frame portion, and front connection means;
 the rear part comprising a rear frame portion, at least one rear ground engaging wheel rotatably mounted on the rear frame portion, and rear connection means;
 the front and rear connection means being adapted to engage each other to connect the front and rear parts of the vehicle together for use;
 wherein the front connection means comprises lower and upper elements, the rear connection means comprises lower and upper elements, and when separated one of the front and rear parts of the vehicle naturally assumes a position which permits access to the lower connection element thereon by the lower connection element on the other of the front and rear parts, and when the lower connection element on the other part is engaged with the lower connection element on the one part and the other part is released the front and rear upper connection elements are automatically brought together and engaged.
2. A vehicle according to claim 1 wherein the vehicle further comprises securing means to secure the front and rear parts together when connected.
3. A vehicle according to claim 1 or 2 wherein the rear part comprises two ground engaging wheels and a drive unit drivably connected thereto.

4. A vehicle according to any one of the preceding claims wherein it is the rear part which naturally assumes the position which permits access to the rear lower connection element.

5. A vehicle according to any one of the preceding claims wherein the front lower connection element comprises downward facing hook formations on either side of the rear of the front frame portion, and the rear lower connection element comprises recess formations on either side of the front of the rear frame portion.

6. A vehicle according to any one of the preceding claims wherein the front upper connection element comprises a tubular formation and the rear upper connection element comprises a tubular seat support member.

7. A vehicle according to claim 6 as appendant directly or indirectly on claim 2 wherein the securing means comprises an elongate member attached to a seat, which is inserted into the aligned tubular formation and tubular seat support member to secure the front and rear parts together.

8. A vehicle according to 7 wherein the securing means further comprises one or more batteries provided to power the drive unit of the vehicle when in place on the front part.

9. A vehicle according to claim 8 wherein the securing means further comprises clip means adapted to clip into place over the one or more batteries to retain them in place on the front part.

10. A vehicle substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings.

11. A personal mobility vehicle comprising a frame, two front ground engaging wheels rotatably and steerably mounted on the frame, wherein each wheel is mounted on the frame by an independent suspension member pivotally mounted on the frame with a suspension unit connected between the suspension members.

12. A vehicle according to claim 11 wherein the two independent suspension members are pivotable with respect to the frame about axes running longitudinally of the vehicle.

13. A vehicle according to claim 11 or 12 wherein the suspension unit is provided above the pivotable connection of the suspension members to the frame.

14. A vehicle according to any one of claims 11 to 13 wherein it further comprises pairs of stops associated with each suspension member to limit their pivotal movement in upward or downward directions.

15. A vehicle according to claim 14 wherein the stops provided to limit downward pivoting of the suspension arms comprise resilient pads.

16. A personal mobility vehicle substantially as hereinbefore described with reference to Figures 5 and 6 of the accompanying drawings.

17. Any novel feature or novel combination of features described herein and/or shown in the accompanying drawings.



Application No: GB 9712251.9
Claims searched: 1 to 10

Examiner: Colin Thompson
Date of search: 5 June 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): B7H (HC)

Int Cl (Ed.6): A61G 5/04

Other: Online: WPI, EDOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2268456 A (Sunrise Medical Ltd) See Figs 4 & 5	1-3
X	WO 92/08638 A1 (Invacare Corp) See Fig 5-7	1-6
X	US 5494126 A (Meeker) See especially Figs 6-10	1,2
X	US 5050695 A (Kleinwolterink) Whole document relevant	1,2,5
X	US 4944359 A (Doman) See Figs 2-5	1-3,5
X	US 3100547 A (Rosenthal) Whole document relevant	1,2

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.